

## Research priorities and future of alfalfa in Latin America

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**Keywords:** alfalfa, future research, Latin America, network platform

### Content

Future actions aimed at the technological development of Latin American's agrifood and agroindustrial systems should seek to anticipate trends and ensure the permanent adjustment of research and development priorities, viewing innovations inspired by the logic of productive chains, which are increasingly dependent upon knowledge and technology.

To ensure quantity and quality for the growing demand of food while preserving natural resources and adding value to the product, it is necessary to invest in research with a transdisciplinary approach in order to manage systems which are increasingly complex and strikingly bound to convergent technologies. The migration of production systems with few activities for those more complex stands out as a strong trend for the next decades. This will certainly require to handle increasingly dynamic processes that will be part of the agribusiness that opens up for the near future.

This scenario will bring in the upcoming decades new agro-socio-environmental paradigms and will present challenges for Latin America as a whole. The advance of urbanization and the new dietary habits of the population will push for a higher and more sophisticated demand for goods and services, which will exert even more pressure for an efficient use of natural resources. In this context, the agribusiness sector needs to reinvent itself, leading to the development of new production patterns focused on delivering products with higher quality control, innocuousness, traceability and greater diversification.

Potential for this change exists. According to the UN (2017), the world population will reach 9.8 billion inhabitants by 2050, and this will require the production of 70% more food. The number of inhabitants of Latin America and the Caribbean will grow 25%, going from 635 million to 793 million in 2061, according to the Economic Commission for Latin America and the Caribbean (POPULAÇÃO ..., 2015). Latin America holds about a third of the world's freshwater resources and more than a quarter of the world's arable land. Its agricultural production has enormous variation, ranging from subsistence to sophisticated agribusiness and represents 16% of the exports in the world (RABOBANK, 2017). Today, about 50% of the region's food production comes from its 14 million small farmers. While for many this means the importance of small production, for entrepreneurs represents a market – i.e. land areas - to be conquered (AGROLAC 2017).

In this promising scenario, plenty of opportunities, Latin America should move forward to support the expansion of its agrifood and agroindustrial systems, taking alfalfa as the basis for one of those Platforms to direct international networks for generating knowledge and promoting innovations and sustainable technological developments in the region.

Why alfalfa? In Latin America there are about 4 million hectares cultivated with alfalfa, most notably in Argentina, nearing 3.2 million hectares, Chile with 120 thousand hectares, followed by Peru and Uruguay with 120 thousand and 70 thousand hectares, respectively. In Brazil, despite the area with alfalfa being still timid, about 35 thousand hectares, the potential of area expansion from the southern region towards the Cerrado and Caatinga biomes stands out.

In addition, alfalfa is a multifaceted plant and presents an unparalleled potential of use other than animal production, from the pharmaceutical and cosmetic industry to human consumption. Regarding animal feeding, it stands out for the unequalled quality characteristics either as exclusive or complementary feed for cattle, goats, equines, sheep, swine, poultry and small animals (pets).

There are relatively few published research reports on alfalfa under Brazilian conditions, as evidenced by studies on research priorities (Vilela et al., 2008). The first evaluations were conducted by Embrapa in the 1990s (Vilela et al., 1994), proving its economic viability (Rodrigues et al., 2008; Tupy et al., 2015).

In Argentina, where alfalfa has traditionally been used for decades, grazing and harvesting to make hay predominate (Basigalup, 2016; Comeron et al., 2015; Comeron & Romero, 2017). Producing high-quality alfalfa hay is promising throughout Latin America in view of the significant regional and global demand. Improving forage quality using conventional and molecular tools is a recurrent breeding objective that should be prioritized. The application of molecular markers and transgenesis widen the possibilities for alfalfa improvement to a much greater extent (Li et al., 2014; Annicchiarico et al., 2015; Biazzi et al., 2017). Crop management and hay machinery are also important topics that must be included in the research agendas.

In the cosmetics industry (ABIHPEC, 2017), alfalfa extract has been used in the composition of creams for facial rejuvenation and hair treatment. In the pharmaceutical industry (Bora & Sharma, 2011), alfalfa extract is used for its hepatoprotective and estrogenic activities, besides the use as a powerful medicine for treating stomach disorders. In modern cuisine (Ribeiro, 2016), alfalfa sprouts are an excellent functional and healthy food with multiple benefits.

It is widely accepted that no organization or isolated group of scientists hold alone the skills to face an increasingly complex and dynamic environment to compete in a globalized market. As it was mentioned before, production systems are becoming increasingly more complex and therefore require an interdisciplinary approach not only to a domestic level but also to an international level. In this context, the Technological Platforms will be able to aid such a transformation, acting as an inductor in the generation of knowledge, enabling the formation of clusters of researchers and institutions that will accelerate the accomplishment of significant advances in the search for competitiveness and technological modernization. This will enrich the capabilities of every country, or an entire region, to effectively participate in a growing and constantly more demanding globalized market.

A summarized conceptual organization chart of the idea of a Virtual Network Platform that could guide future research on alfalfa in Latin America, coordinated by the Brazilian Agricultural Research Corporation (Embrapa) and the Argentine National Institute of Agricultural Technology (INTA) is shown in Figure 1. Such network would give to educational and research institutions from the other Latin American countries access to information and the opportunity to actively participate in the process of the development of this platform through collaborative research projects and data generation.

Priorities will be classified according to the degree of relevance, since countries like Brazil, with distinctive characteristics of soils and tropical climate, have different priorities from countries like Argentina, Uruguay and Chile, which in addition are in a more advanced stage of knowledge concerning alfalfa. The exchange of information among potential users of the

Network will create a cumulative expertise that will be of fundamental importance for future alfalfa research, avoiding duplication of actions and, at the same time, serving as a database available for the productive sectors.

We propose that the Alfalfa Research and Development Latin American Platform be based on four structural axes: (1) Efficient Production, connected to the agronomic aspects of the crop; (2) Animal Production, including different forms of use; (3) Quality and Innocuousness applied to human feeding; and (4) Novel Products, involving the pharmaceutical and cosmetic industries. All axes will be aimed to add value to the alfalfa productive chain via the application of adapted or generated technological and managerial innovations.

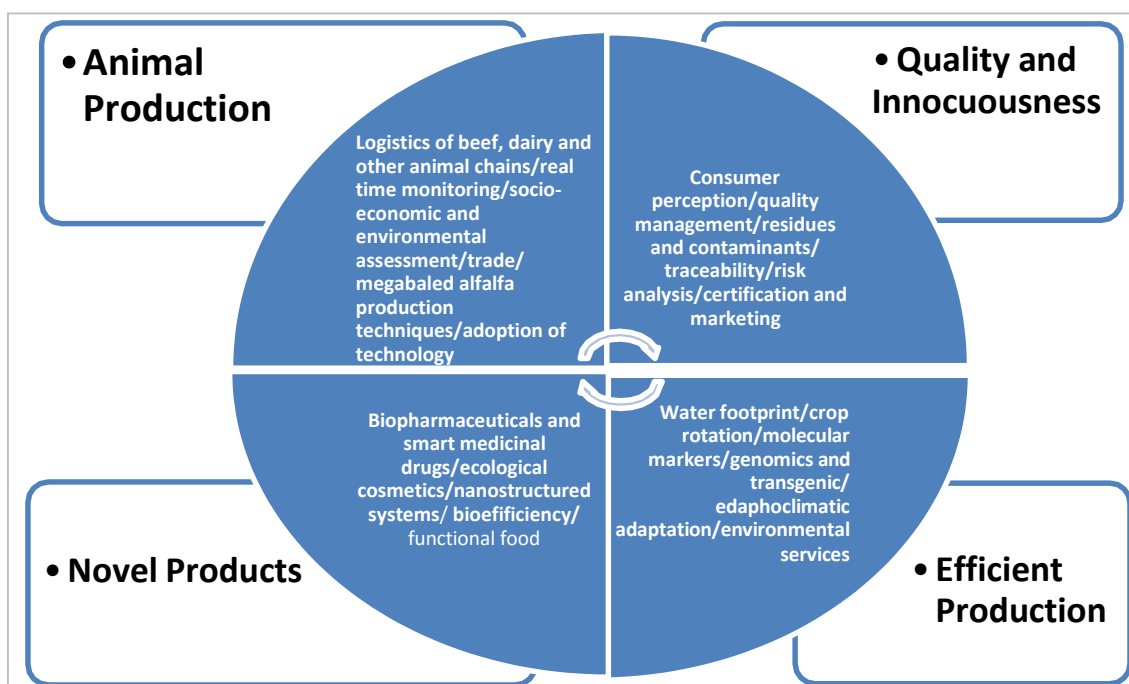


Figure 1. Organization chart of the Alfalfa Research and Development Latin American Platform, structured in four axes: Efficient Production; Novel Products; Quality and Innocuousness; and Animal Production. Topics to be addressed are exemplified in each quarter of the chart under their respective axes.

In this context, the book "**Exploração racional da alfafa: do cultivo à sua utilização** (*Rational Exploitation of Alfalfa: from Cultivation to its Use*)", presented in this congress, will be the initial step for the creation of the Platform. The book contains 22 chapters, subdivided into three main subjects: agronomic aspects to improve crop production, alfalfa multipurpose profile and future trends, and prioritized research lines, with the propose of the Virtual Network for Research and Innovation in Alfalfa for Latin America - **REPI- AL**alfa

The editors, Duarte Vilela and Reinaldo de Paula Ferreira, researchers from Embrapa, Brazil; Dilermando Miranda da Fonseca, professor at the Federal University of Viçosa and Daniel Horacio Basigalup, researcher from INTA, Argentina kindly present this book, which is published in two versions, Portuguese and Spanish and it is edited in two formats, printed and E-book.

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